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Range extensions for the Barking Gecko, *Nephrurus milii* (Squamata: Gekkonidae)

S A Thompson[1], G G Thompson[2] & G R Finlayson[1]

[1] Coffey Environments
PO Box 4223 Victoria Park 6979 Australia
✉ scott_thompson@coffey.com
✉graeme_finlayson@coffey.com

[2] Edith Cowan University
Joondalup Drive, Joondalup, WA, 6027
✉ g.thompson@ecu.edu.au

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Abstract

Recent captures of *Nephrurus milii* increase its recorded geographical distribution, suggesting the goldfields population extends further north than has previously been recorded and the Pilbara population is more widespread than has been earlier reported. The relative abundance of this species appears to differ appreciably across its range with the consequence that its presence could easily have gone undetected in the northern mid-west and Murchison regions and other sections of the Pilbara due to a lack of adequate survey effort.

Key words: disjunct populations, Western Australia, lizard

Introduction

Menz & Cullen (2006) recently reported a disjunct population of *Nephrurus milii* in the eastern Pillbara, near Packsaddle Range and commented on a sighting of a specimen by Michael Kearney at Handrai Pool in Karijini National Park. The Barking Gecko, *N. milii*, is known to occupy a variety of habitat types, including sand plains, woodlands, shrublands, rocky outcrops, breakaways and rubbish tip sites (Storr *et al.* 1990; Thompson & Thompson, 2006; Wilson & Swan, 2005). Until recently the known distribution of *N. milii* was across the southern half of Australia from Rockhampton, Queensland to Shark Bay Western Australia (Wilson & Swan, 2005). We report here on two recent captures that extend its geographic distribution north in the Goldfields and north-west in the Pilbara and comment on its highly variable abundance and the consequential implications for detecting the presence of this and other isolated populations.

Observations

On 15 January 2007 at about 2100hr, a Barking Gecko was observed at (WGS 84) 51 239592E, 7027514N, in an area about 30km south of Wiluna (Fig 1). This gecko was foraging in an open Mulga and chenopod scrubland. The specimen was vouchered with the Western Australian Museum (R166876). This record represents a range extension approximately 125km north of the commonly published range for *N. milii* in the Goldfields. A pit-trapping program (3360 bucket pit trap-nights, 3360 pipe pit trap-nights and 6720 funnel trap-nights) in the area during October 2006 and January 2007 failed to catch another specimen.

On 18 November 2008, a *N. milii* was caught in a pit-trap in the Hamersley Ranges, north-west of its known distribution ((WGS 84) 50 594731E 7553687N). This specimen was vouchered with the Western Australian Museum (R163638). It was caught in the floor of a gorge valley that was surrounded by steep rocky slopes. The valley floor was a gravelly-clay substrate vegetated with eucalypts and other small trees to about 2.5m over spinifex and small shrubs. This area had been trapped in March 2008 but the presence of *N. milii* was not detected. A trapping program in similar habitats in the vicinity of where this specimen was caught consisted of 9420 bucket pit trap-nights, 9420 pipe pit trap-nights and 21840 funnel trap-nights during March and November 2008.

In another recent trapping survey in an area approximately 170km north of Laverton, again on the periphery of *N. milii*'s goldfields distribution in spinifex

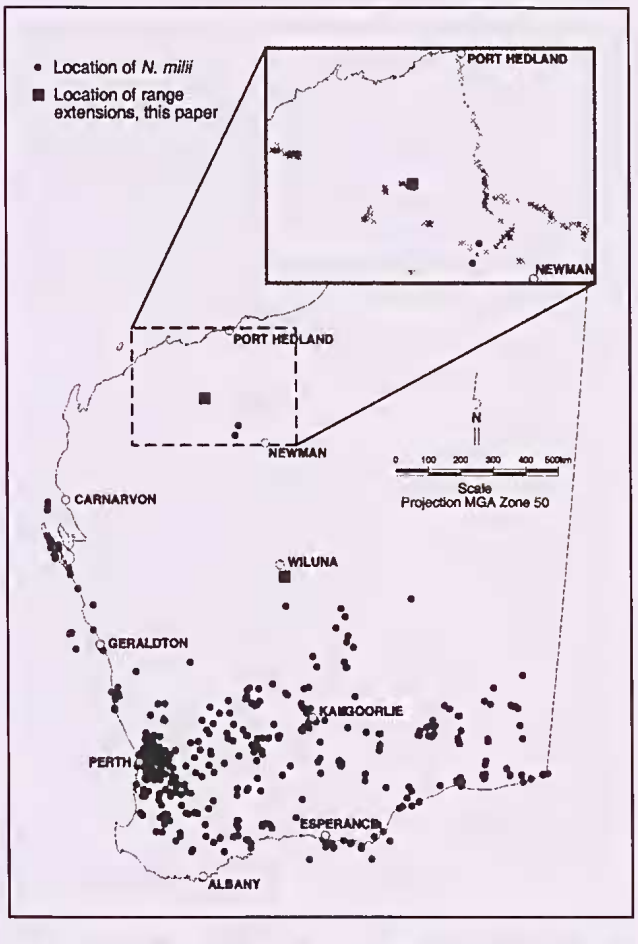

Figure 1. Capture locations for *N. milii*. Squares represents the two range extensions reported here, dots are other records of *N. milii* from the Western Australian Museum and crosses are survey sites in the Pilbara where *N. milii* was not caught.

vegetated areas, eucalypt woodlands over spinifex or shrubs and open mulga woodlands, no *N. milii* were caught using pit-traps (4032 bucket pit trap-nights, 4032 pipe pit trap-nights) and funnels (8064 funnel trap-nights), however, an individual was seen on the road during spotlighting ((WGS 84) 51 434150E, 6958000N). In another trapping program east of Ravensthorpe in a variety of habitats including eucalypt woodlands and heath, no *N. milii* were trapped using pit-traps (1680 bucket trap-nights, 1680 pipe pit trap-nights) and funnel traps (3360 funnel trap-nights), however a single individual was caught during hand searching ((WGS 84) 51 257581E, 6276324N).

Discussion

It is common to find isolated populations of reptile species within their published geographical distribution as few species are either evenly distributed across their geographic range or evenly distributed within their recognised preferred habitats. In some areas *N. milii* has a high abundance and is readily detected early in a trapping program, however, in other areas it appears to have a very low abundance and is rarely trapped. For example, during extensive fauna surveys around Ora Banda (Thompson & Thompson 2005; Thompson *et al.* 2003) 946 *N. milli* were caught in a diverse range of habitat types including mine waste dumps, rocky areas cover with spinifex, clay soils vegetated with tall eucalypts or low chenopod shrubs. Further analysis of the Ora Banda data shows that *N. milii* were significantly ($t_{4,7}$ = 4.07, P <0.05) more abundant on rehabilitated waste dumps than in adjacent areas of undisturbed habitat. Mean capture rates in areas of undisturbed habitat were 3.33 per 1000 trap-nights compared with 18.2 per 1000 trap-nights in rehabilitated waste dumps. Higher numbers on waste dumps presumably reflected the abundance of crevices in this habitat and the ability of this species to rapidly colonise new areas after major disturbance (Thompson & Thompson 2007).

Elsewhere within *N. milii*'s geographic distribution its abundance appears to be low. Cowan & How's (2004) survey of Goongarrie Station during March 1979 and 2002, and October 1980 and 2001 recorded only nine individuals all of which were caught at a single site. This survey site is about 75km north of Ora Banda and is both well within the previously recorded geographic distribution for *N. milii* and contains habitat similar to that at the Ora Banda survey sites. During our trapping programs north of Laverton, south of Wiluna and east of Ravensthorpe no *N. milii* were caught in pit-traps or funnel traps, and they were only detected during spotlighting or hand-searching. It is therefore apparent that this species can be relatively rare within its distribution and could easily go undetected during a trapping program.

Although there have been numerous fauna surveys recently conducted in the Pilbara (296 survey sites; see insert in Fig 1; Biota Environmental Sciences 2002a,b,c; 2004; 2005a,b,c; 2008; Davis *et al.* 2005; Johnstone 1983; Ninox Wildlife Consulting 1985; 1992; Texasgulf 1979), many of which have been undertaken to support an environmental impact assessment for a mining development, *N. milii* has gone undetected until the Menz and Cullen (2006) capture.

The presence of a disjunct population of *N. milii* in the Pilbara raises the questions of how did they get there and how widely are they distributed in the region. Figure 1 indicates they are absent from the northern mid-west and inland Murchison regions. However, the area between Wiluna and the Pilbara has generally been poorly surveyed, so it is possible that *N. milii* are present in the area in low numbers and have gone undetected.

Range extensions often go unreported when detected during fauna surveys undertaken by environmental consultants. For example, in the northern Goldfields, Ninox Wildlife Consulting (1994) reported catching *N. milii* during its survey of a site close to our survey sites about 30km south of Wiluna, but did not comment about its distribution or suggest that it was a possible range extension in its report to the client. This maybe because the consultant is unaware the capture represents a range extension or consultants are too busy and do not see the information as being note worthy.

The recent capture of *N. milii* in the Pilbara raises issues to do with the intensity of fauna surveys undertaken to support environmental impact assessments. Remnant and isolated populations are generally recognised as being of conservation significance. Sometimes, there is an abundance of individuals in these isolated populations, whereas other times they are relatively rare. If they are rare, then the probability of detecting their presence with a low intensity survey effort is low. As the purpose of these surveys is to assess the potential impact of vegetation clearing and development on the fauna assemblage in an area, and in particular identify the presence of conservation significant species, there is a strong case for more intensive and comprehensive surveys being undertaken to ensure these isolated populations are detected.

Typically, the trapping effort undertaken by environmental consultants to assess the presence and relative abundance of small vertebrate fauna in a habitat is low and unlikely to catch most of the species present. Thompson *et al.* (2007) recommended for habitats that were species poor (*e.g.* 10-15 species), 70-100 individuals need to be caught to record about 80% of the species, and 90-200 individuals caught to record about 90% of the species. When a habitat contained approximately 35 species, then 100-280 individuals need to be caught to record 80% of the species, and 200-600 individuals will need to be caught to record 90% of the species, When the proportion of rare species in a habitat was high (*e.g.* high proportion of singletons and doubletons), then a higher trapping effort will be required.

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References

*ATA Environmental 2007 Terrestrial Vertebrate Fauna Assessment, Honeymoon Well. Unpublished Report for LionOre Australia.

*Biota Environmental Sciences 2002a Hope Downs Iron Ore Project; Rail and Port Facility. Unpublished report for Hope Downs Management Services, Perth.

*Biota Environmental Sciences 2002b Proposed Hope Downs Rail Corridor from Weeli Wolli Springs Siding to Port Hedland: Vertebrate Fauna Survey. Unpublished report for Hope Downs Management Services, Perth.

*Biota Environmental Sciences 2002c Hope Downs Rail Corridor Extension – Hamersley Range: Vertebrate Fauna Survey. Unpublished report for Hope Downs Management Services, Perth.

*Biota Environmental Sciences 2004 Fauna Habitat and Fauna Assemblage of the Proposed FMG Stage A Rail Corridor. Unpublished report for Fortescue Metals Group, Perth.

*Biota Environmental Sciences 2005a Fauna and Fauna Assemblages of the Proposed Stage B Rail Corridor and Mindy Mindy, Christmas Creek, Mt Lewin and Mt Nicholas mine Areas. Unpublished report for Fortescue Metals Group, Perth.

*Biota Environmental Sciences 2005b Fauna Habitats and Fauna Assemblage of Mesa A and G, near Pannawonica. Unpublished report for Robe River Associates, Perth.

*Biota Environmental Sciences 2005c Fauna Habitats and Fauna Assemblages of Brockman Syncline 4 Project, near Tom Price. Unpublished report for Hamersley Iron Pty Ltd, Perth.

*Biota Environmental Sciences 2006 Fauna Habitats and Fauna Assemblage Survey of the Mt. Keith Mine Project Area. Unpublished report for Nickel West Operations, BHP Billiton.

*Biota Environmental Sciences 2008 Marandoo Mine Phase 2 Seasonal Fauna Survey. Unpublished report for Rio Tinto, Perth.

Cowan M A & How R A 2004 Comparison of ground vertebrate assemblages in arid Western Australia in different seasons and decades. Records of the Western Australian Museum 22: 91-100.

*Davis R A, Wilcox J A, Metcalf B M & Bamford M J 2005 Fauna Survey of the Proposed Iron Ore Mine Cloud Break. Unpublished report for Fortescue Metals Group, Perth.

Johnstone R E 1983 Herpetofauna of the Hamersley Range National Park Western Australia. *In* B G Muir (ed) A Fauna Survey of the Hamersley Range National Park Western Australia 1980. National Parks Authority of Western Australia, Perth, 7-11.

Menz M H M & Cullen P 2006 Occurrence of the Barking Gecko *Underwoodisaurus milii* (Bory 1825) (Gekkonidae) in the Pilbara Region, Western Australia. Journal of the Royal Society of Western Australia 89(2): 98-90.

*Ninox Wildlife Consulting 1992 Vertebrate Fauna Assessments (1975-1991), Marandoo Project Area. Unpublished report for Enviroscan, Perth.

*Ninox Wildlife Consulting 1994 A Fauna Assessment of the Honeymoon Well Project Area, April and September 1993. Unpublished report prepared for Minenco Pty Limited.

*Ninox Wildlife Consulting 1985 A Vertebrate Fauna Survey of the Mount Channar Area, Near Paraburdoo, Western Australia. Unpublished report for Hamersley Iron, Pty Ltd, Perth.

Storr G M, Smith L A & Johnstone R E 1990 Lizards of Western Australia III Geckos and Pygopods. Western Australian Museum, Perth.

*Texasgulf 1979 Marandoo Flora and Fauna. Internal report for Texasgulf, Perth.

Thompson S A & Thompson G G 2006 Reptiles of the Western Australian Goldfields. Goldfields Environmental Management Group. Kalgoorlie WA.

Thompson S A & Thompson G G 2005 Temporal variations in reptile assemblages in the Goldfields of Western Australia. Journal of the Royal Society of Western Australia 88: 25-36.

Thompson G G, Thompson S A, Withers P C & Pianka E R 2003 Diversity and abundance of pit-trapped reptiles in Australian arid and mesic habitats: Biodiversity for environmental impact assessments. Pacific Conservation Biology 9: 120-135.

Thompson G G & Thompson S A 2007 Early and late colonizers in mine site rehabilitated waste dumps in the Goldfields of Western Australia. Pacific Conservation Biology 13: 235-243.

Thompson G G, Thompson S A, Withers P C & Fraser J 2007 Determining adequate trapping effort and species richness using species accumulation curves for environmental impact assessments. Austral Ecology 32: 570-580.

Wilson S & Swan G 2005 A complete guide to reptiles of Australia. Reed New Holland. Sydney, Australia.

* These reports are available from the Western Australian Environmental Protection Authority Library at Level 4, 168 St Georges Terrace, Perth, 6000.